Masaka, E., Reed, S., Oosthuizen, J., & Davidson, M. (2022). Awareness of business owners and environmental health officers regarding health risks associated with the use of water mist systems in Australia. *Journal of Environmental Health*, *84*(10), 8–14.

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Note. This supplemental file was submitted by the authors along with the respective peer-reviewed article and has been posted online due to space limitations at https://www.neha.org/jeh/supplemental. The *Journal of Environmental Health* did not copy edit this file. The authors have provided this supplemental file as an extra resource should the reader want more information.

Questionnaire for water misting system owners/operators

Start of Block: Welcome to the survey

Q1 **Information letter**

An assessment of risks associated with the use of water misting systems as a cooling intervention in public places in the Pilbara region of Western Australia

My name is Edmore Masaka. I am a PhD student enrolled with the Edith Cowan University, School of Medical and Health Sciences. I am conducting research on the health risks associated with the use of water misting systems to reduce air temperatures in places where people gather for recreation, sports, meetings, and other functions. The project is being supervised by Associate Professors Sue Reed and Jacques Oosthuizen of the university's School of Medical and Health Sciences. I am going to provide you with some information about the study and then invite you to take part in the project. You and other owners and operators of water misting systems in the Pilbara region of Western Australia are being invited to participate in this study. It is felt that your expertise and experience in operating and maintaining these systems in the Pilbara will significantly contribute to the understanding and knowledge of the risks associated with them.

What is this study about and why carry it out?

Exposure of people to bacteria which grow in plumbing systems able to spray small particles of water droplets has been linked to diseases of the lungs, ears and brain caused by breathing in these bacteria. Water misting systems being installed and used in public places and in domestic houses to reduce air temperatures are able to produce small water particles which can contain this type of bacteria. This study aims to find out whether water misting systems actually create an environment where these bacteria can grow and also whether they can produce and release the bacteria into the environment where they can be breathed in by people. The study also wants to know more about the knowledge, attitudes, and practices of those involved in the operation of the water misting systems regarding the health risks of using the systems

What does participation in the research project involve?

Your participation will involve completing a self-completion questionnaire to learn more about your knowledge of risks associated with these systems, operating procedures, and maintenance requirements. The questionnaire will be emailed to you for your completion and submission online. It is expected that it will take about fifteen to twenty minutes to complete the

questionnaire. You will also be requested to grant permission for the inspection and collection of water, biofilm and aerosol samples from your water misting system/s for the laboratory testing for bacteria which cause disease in people exposed to the water sprays.

To what extent is participation voluntary, and what are the implications of withdrawing that participation?

Your participation in this study and the decision to grant permission for the inspection and sampling of your water misting system/s is entirely voluntary, and the choice that you make will not in any way have a bearing on your personal, work or social life. Please be advised that you have the option not to answer any question you feel uncomfortable with and not to grant permission for the inspection and sampling of your water misting system/s. You can voluntarily withdraw from the study at any time without any consequence.

What will happen to the information collected, and is privacy and confidentiality assured?

The information you provide will not be shared with anyone outside the research team. All the information you provide will be kept confidential, anonymous, and identified as group data without your name or your organisation's name. The data is then stored securely at the Edith Cowan University's School of Medical and Health Sciences. Participant privacy, and the confidentiality of information disclosed by participants, is assured at all other times. The data will be used only for this project and will not be used in any extended or future research without first obtaining explicit written consent from participants. Your participation in this study is likely going to bring benefits to you, the community and the nation by identifying ways to prevent diseases associated with these water misting systems and also improve your internal monitoring procedures and regulatory control of these systems for the good of public health. A summary of the research findings will be made available to the participants and the school.

Is this research approved?

The research has been approved by *Edith Cowan's Ethics Committee* and has met the ECU Policy for the Conduct of Ethical Human Research.

Who do I contact if I wish to discuss the project further?

If you would like to discuss any aspect of this study with a member of the research team, please contact me on the number provided below.

Mr Edmore Masaka. PhD Student
School of Medical and Health Sciences,
Edith Cowan University
Cell: 0407993409Email: emasaka@our.ecu.edu.au

If you wish to speak with the project supervisors about the conduct of the project, please contact: Associate Professors Sue Reed and Jacques Oosthuizen of the ECU School of Medical and Health Sciences on telephone number (08) 63042243.

Q2 Please indicate your willingness to participate in this study by selecting YES below. However if you do not wish to participate in the study, please select NO.

- ○ Yes (1)
- ○ No (2)

Skip To: End of Survey If Please indicate your willingness to participate in this study by selecting YES below. However if... = No

Q3 Which of the following best describes the type/s of water misting system/s that you work with?

- ☐ Public (1)
- ☐ Private (2)
- ☐ Public and Private (3)

Q4 What is the purpose for which you use a water misting system? (Please select all that apply)

- ☐ To assist in reducing ambient temperature (1)
- ☐ To assist in humidifying ambient air (2)
- ☐ To increase the comfort level of the public place (3)
- ☐ Other (4)

Q5 What type of nozzles/sprinklers are fitted to your water misting system ?

- ○ Pneumatic (air pressure operated) (1)
- ○ Hydraulic (water pressure operated) (2)

Q6 Which of the following best describes the source of water for your misting system ?

- ○ Bore water (treated)-chlorine, bromine, ultra violet light etc (1)
- ○ Bore water (untreated) (2)
- ○ Scheme water (3)
- ○ Surface water (river, dam etc.) (4)
- ○ Reverse Osmosis (RO) water (5)
- ○ Rain water tank (6)

Q7 Do you think the formation and release of tiny water mists into the ambient air can cause a public health concern?

- ○ Yes (1)
- ○ No (2)

Skip To: Q9 If Do you think the formation and release of tiny water mists into the ambient air can cause a publi... = No

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Q8 Which of the following public health risks do you think the water mists may cause?

- ○ Biological hazards (1)
- ○ Chemical hazards (4)
- ○ High humidity (2)
- ○ All of the above (3)

Q9 Which of the following best describes the public health importance of water misting systems?

- ○ Not important (1)
- ○ Important (2)
- ○ Very important (3)

Q10 Which of the following operational condition/s do you think promote microbial growth in water misting systems ? (Please select all that apply)

- [ ] Increased water temperature 25 Degrees Celcius – 50 Degrees Celcius (1)
- [ ] Low levels of carbon in the water (2)
- [ ] pH (6.8 – 7.9) (3)
- [ ] Presence of slime (Biofilm) on the internal plumbing pipework and fixtures' surfaces (4)
- [ ] How often the system is used (5)
- [ ] Presence of dead legs in the plumbing system (6)
- [ ] Poor maintenance (7)

Q11 Which of the following best describes the level of maintenance which you implement for your water misting system ?

- ○ As per manufacturer's specifications (1)
- ○ Occasional or never (2)

Q12 Which of the following do you think are important maintenance aspects of water misting systems (Please select all that apply) ?

- [ ] Adequate disinfection of the water (1)
- [ ] Drainage of residual water after each use (2)
- [ ] Regular flushing and cleaning of the plumbing pipework (once every month) (3)
- [ ] The removal of dead legs in the plumbing network of the system (4)
- [ ] Adhering to manufacturer's maintenance specifications (5)
- [ ] Addition of incoming water filtration system (6)

Q13 Have you observed the build up of any crystalline solids or biosolids in the form of biofilms, sludge or mud in your water misting system?

- ○ Yes (1)
- ○ No (2)

Q14 Do you have and use a cleaning and maintenance schedule for your water misting system ?

- ○ Yes (1)
- ○ No (2)

Q15 Have you received any training on the operation of water misting systems?

- ○ Yes (1)
- ○ No (2)

Skip To: Q18 If Have you received any training on the operation of water misting systems? = No

Q16 Which of the following best describes the type of training you received ?

- ○ Formal (1)
- ○ Inhouse (2)

Skip To: Q18 If Which of the following best describes the type of training you received ? = Inhouse

Q17 Which of the following formal training course did you undergo ? (Please select all that apply)

- ☐ TAFE accredited certificate course (1)
- ☐ TAFE accredited diploma course (2)
- ☐ Royal life saving pool operations course (3)
- ☐ Water corporation accredited course (4)
- ☐ Other (5)

Q18 Please rate your level of competence in operating the water misting system.

- [ ] Extremely competent (1)
- [ ] Moderately competent (2)
- [ ] Slightly competent (3)
- [ ] Neither competent nor incompetent (4)
- [ ] Slightly incompetent (5)
- [ ] Moderately incompetent (6)
- [ ] Extremely incompetent (7)

Q19 Have you had any formal complaints made against your misting system which resulted in a public health investigation by the regulatory authorities ?

- ○ Yes (1)
- ○ No (2)
- ○ Do not want to indicate (3)

Q23 Thank you for your participation and time. If you have any enquiry please feel free to contact Edmore Masaka on mobile number 0407993409 or by email at emasaka@our.ecu.edu.au.Thank you very much.

End of Block: Welcome to the survey